614.1 : 551.521

AIR POLLUTION POTENTIAL OVER SOME OF THE INDIAN CITIES

1. Objective evaluation of the pollution problems requires the knowledge of transport and dispersal processes in the atmosphere.

The meteorological factors directly involved in these processes comprise wind which transports the air borne material and precipitation which removes or dilutes the contaminants. The extent of air pollution over a place can be estimated by computing the ventilation coefficient which is the product of wind speed, water vapour content and mixing depth, where the mixing depth is defined as the layer near the ground, through which the pollutant is stirred and diluted by convection. Mixing depth is calculated from the rawin/radiosonde and surface temperature data. The graphical method of computation of mixing depth is based on Holzworth's method (1967) using a T-ϕ gram. The wind which is the transport agency, determines the dilution of air over the place. The presence of water vapour alters the density of air.

Williams (1964), Miller (1967) and Raman (1972) have computed the pollution potential and ventilation coefficient using wind speed and mixing depth. Raghavan and Yadav (1966) have developed a method of computing the depletion of Pyroheliometer measurements of direct solar radiation due to scattering by the atmospheric gases and water vapour, and worked out the dust depletion factor for New Delhi in the hot dry season.

In the present study, the degree of pollution is estimated using the radiosonde/rawin sonde data, for all days (rainy as well as non-rainy) using all the three factors in the ventilation coefficient, *viz.*, speed of wind, mixing depth and water vapour content in the atmosphere.

2. Rawin sonde and Radiosonde data for seven stations listed in Table 1, for the period 1961-65 have been used in the analysis. Pollution Potential (P.P.) which is the reciprocal of the product of the three parameters, has been calculated for each month for each of these seven places ; the monthly values of P.P. are depicted in Fig. 1.

3. Fig. 1 reveals that the maximum pollution exists in winter months over inland stations and in the March-April (Hot Weather) season over the coastal stations. Over all the stations the minimum occurs in the southwest monsoon season apparently due to the washing out of the pollutant by the rain water.

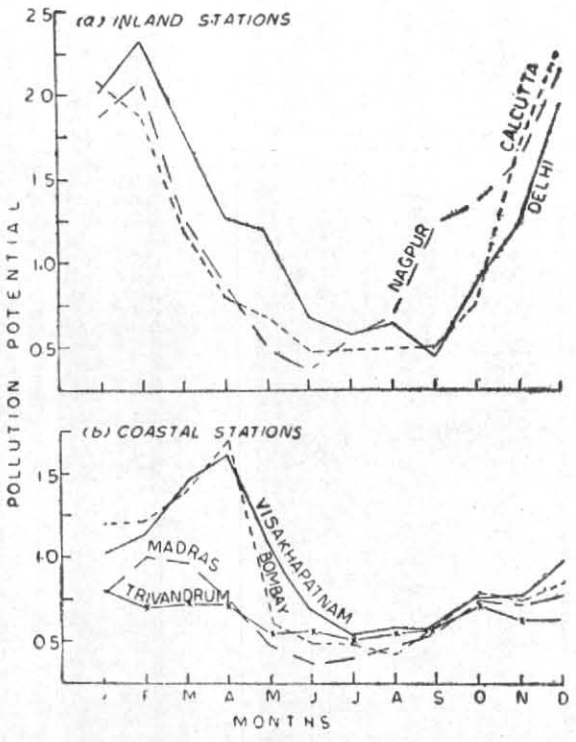

Fig. 1

Air pollution potential coefficient

Over Trivandrum, the general level of the P.P. is very low in comparison with the conditions over other places. This is due to the fact that the water vapour content over Trivandrum is considerable and continues throughout the year except for January and February, all other months are rainy months. This fact explains the low level of P.P. with a maximum pollution potential in winter.

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TABLE 1

Air Pollution Potential (P.P.) coefficient

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bombay	1·20	1·21	1·41	1·68	0·60	0·48	0·47	0·41	0·57	0·78	0·73	0·84
Calcutta	2·16	1·87	1·29	0·79	0·66	0·45	0·48	0·49	0·49	0·75	1·66	2·24
Madras	0·78	1·02	0·97	0·76	0·47	0·36	0·40	0·46	0·55	0·75	0·71	0·76
Nagpur	1·87	2·07	1·27	0·85	0·48	0·32	0·54	0·66	1·22	1·34	1·60	2·12
New Delhi	2·03	2·34	1·31	1·27	1·18	0·67	0·56	0·64	0·44	0·86	1·24	1·94
Trivandrum	0·82	0·70	0·79	0·74	0·55	0·55	0·51	0·54	0·56	0·73	0·62	0·65
Visakhapatnam	1·02	1·16	1·44	1·60	1·04	0·68	0·52	0·57	0·58	0·75	0·74	0·98

P.P. = Pollution potential coefficient $= 10^4/xyz$ where x = Mixing depth in m, y = Precipitable water vapour mm/cm^3, z = Mean wind speed m/sec

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